CLAIMS

1. A data transmission device connected to a ring-type data transmission network, which electrically communicates with another device via a transmission line in a unidirectional manner, the data transmission device comprising:

a processing section for processing received data and data to be transmitted based on a predetermined communications protocol;

a reception section for receiving an electric signal sent from a preceding device and outputting data contained in the electric signal to the processing section;

a transmission section for converting a result of a process by the processing section into an electric signal and transmitting the electric signal to a successive device; and

a control section for controlling operation of the processing section, the reception section, and the transmission section in accordance with an operation mode of its own device, wherein,

the reception section detects cessation of the electric signal sent from the preceding device and, in response to the detection, stops operating, and

in response to the detection, the transmission section stops operating and stops sending the electric signal to the successive device.

2. The data transmission device according to claim 1,

wherein,

if the cessation of the electric signal sent from the preceding device is detected, the reception section transmits, to the control section, a data cessation signal for indicating the cessation, and

based on the data cessation signal transmitted from the reception section, the control section stops operation of the processing section.

3. The data transmission device according to claim 1, wherein,

if the cessation of the electric signal sent from the preceding device is detected, the reception section transmits, to the control section, a data cessation signal for indicating the cessation,

based on the data cessation signal transmitted from the reception section, the control section outputs a signal for stopping operation of the reception section and the transmission section,

in response to the signal outputted from the control section in response to the detection, the reception section stops operating, and

in response to the signal outputted from the control section in response to the detection, the transmission section stops operating and stops sending the electric signal to the successive

device.

4. The data transmission device according to claim 1, further comprising a power supply section for supplying power to the processing section, the reception section, and the transmission section, wherein,

if the cessation of the electric signal sent from the preceding device is detected, the reception section transmits, to the control section, a data cessation signal for indicating the cessation, and

based on the data cessation signal transmitted from the reception section, the control section stops the power supply section from supplying power to the processing section, the reception section, and the transmission section.

5. The data transmission device according to claim 1, further comprising a signal monitoring section for detecting the electric signal sent from the preceding device and transmitting, to the control section, an electric-signal detection signal for indicating the detection, wherein,

if suspended sending of the electric signal sent from the preceding device is resumed, the signal monitoring section detects the electric signal sent from the preceding device, and transmits, to the control section, the electric-signal detection signal for indicating the detection,

based on the electric-signal detection signal transmitted from the signal monitoring section, the control section starts operation of the processing section, the reception section, and the transmission section, and

by control of the control section, the transmission section starts operating and starts sending the electric signal to the successive device.

6. The data transmission device according to claim 5, wherein, the electric signal which the transmission section sends to the successive device after starting operating by control of the control section is a lock signal for establishing clock synchronization.

7. The data transmission device according to claim 1, wherein the communications protocol used by the processing section is defined by Media Oriented Systems Transport (MOST).

8. A data transmission system including a plurality of data transmission devices connected via a transmission line so as to form a ring structure, in which the data transmission devices electrically communicate with one another in a unidirectional manner,

the data transmission devices each comprising:

a processing section for processing received data and

data to be transmitted based on a predetermined communications protocol;

a reception section for receiving an electric signal sent from a preceding data transmission device and outputting data contained in the electric signal to the processing section;

a transmission section for converting a result of a process by the processing section into an electric signal and transmitting the electric signal to a successive data transmission device; and

a control section for controlling operation of the processing section, the reception section, and the transmission section in accordance with an operation mode of its own device, wherein,

in at least one of the data transmission devices, the control section stops operation of the processing section, the reception section, and the transmission section of its own device based on a predetermined condition for shift, and the transmission section stops transmission of the electric signal, and

in another data transmission device, the reception section of its own device detects cessation of the electric signal sent from a preceding data transmission device and, in response to the detection, stops operating; and the transmission section of its own device stops operating in response to the detection and stops sending the electric signal to a successive data transmission device.

9. The data transmission system according to claim 8, wherein,

in the other data transmission device,

if the cessation of the electric signal sent from the preceding data transmission device is detected, the reception section transmits, to the control section of its own device, a data cessation signal for indicating the cessation, and

based on the data cessation signal transmitted from the reception section of its own device, the control section stops operation of the processing section of its own device.

10. The data transmission system according to claim 8, wherein

in the other data transmission device,

if the cessation of the electric signal sent from the preceding data transmission device is detected, the reception section transmits, to the control section of its own device, a data cessation signal for indicating the cessation,

based on the data cessation signal transmitted from the reception section of its own device, the control section outputs a signal for stopping operation of the reception section and the transmission section of its own device,

in response to the signal outputted from the control section of its own device in response to the detection, the reception

section stops operating, and

in response to the signal outputted from the control section of its own device in response to the detection, the transmission section stops operating and stops sending the electric signal to the successive data transmission device.

11. The data transmission system according to claim 8, wherein,

the data transmission devices each further comprise a power supply section for supplying power to the processing section, the reception section, and the transmission section of its own device,

if the cessation of the electric signal sent from the preceding data transmission device is detected, the reception section transmits, to the control section of its own device, a data cessation signal for indicating the cessation, and

based on the data cessation signal transmitted from the reception section of its own device, the control section stops the power supply section of its own device from supplying power to the processing section, the reception section, and the transmission section.

12. The data transmission system according to claim 8, wherein,

the data transmission devices each further comprise a signal monitoring section for detecting the electric signal sent from

the preceding data transmission device and transmitting, to the control section, an electric-signal detection signal for indicating the detection,

in at least one of the data transmission devices, based on a predetermined return condition, the control section starts operation of the processing section, the reception section, and the transmission section of its own device in stopped state, and the transmission section resumes the transmission of the electric signal,

in another data transmission device, if suspended sending of the electric signal sent from the preceding data transmission device is resumed, the signal monitoring section detects the electric signal sent from the preceding data transmission device, and transmits, to the control section of its own device, the electric-signal detection signal for indicating the detection; based on the electric-signal detection signal transmitted from the signal monitoring section, the control section starts operation of the processing section, the reception section, and the transmission section of its own device; and the transmission section starts operating and starts sending the electric signal to the successive data transmission device.

13. The data transmission system according to claim 12, wherein the electric signal which each transmission section sends to the successive data transmission device after starting operating

by control of the control section is a lock signal for establishing clock synchronization with each other.

14. The data transmission system according to claim 13, wherein the data transmission device which resumes the transmission of the electric signal based on the predetermined return condition is a master, which performs data transmission with a clock held thereby and is connected to the data transmission system.

15. The data transmission system according to claim 8, wherein the communications protocol used by the processing section is defined by Media Oriented Systems Transport (MOST).

16. A data transmission method in which a plurality of nodes are connected via a transmission line so as to form a ring structure and each node electrically communicates with one another in a unidirectional manner, the method comprising:

a processing step, performed by each node, of processing received data and data to be transmitted based on a predetermined communications protocol;

a reception step, performed by each node, of receiving an electric signal sent from a preceding node and sending data contained in the electric signal to the processing step;

a transmission step, performed by each node, of transmitting a result of a process by the processing step to a successive node

as an electric signal; and

a control step, performed by each node, of controlling operation of the processing step, the reception step, and the transmission step in accordance with an operation mode, wherein,

in at least one of the nodes, the control step stops operation by the processing step, the reception step, and the transmission step of the node based on a predetermined condition for shift, and the transmission step stops transmission of the electric signal, and

in another node, the reception step detects cessation of the electric signal sent from a preceding node and, in response to the detection, stops operation; and the transmission step of its own node stops operation in response to the detection and stops sending the electric signal to a successive node.

17. The data transmission method according to claim 16, wherein,

in the other node,

if the cessation of the electric signal sent from the preceding node is detected, the reception step sends, to the control step of its own node, a notification indicating the cessation, and

based on the notification sent by the reception step of its own node, the control step stops operation by the processing step of its own node.

18. The data transmission method according to claim 16, wherein

in the other node,

if the cessation of the electric signal sent from the preceding node is detected, the reception step sends, to the control step of its own node, a notification indicating the cessation,

based on the notification sent by the reception step of its own node, the control step sends a notification for stopping operation by the reception step and the transmission step of its own node,

in response to the notification sent by the control step of its own node in response to the detection, the reception step stops operation, and

in response to the notification sent by the control step of its own node in response to the detection, the transmission step stops operation and stops sending the electric signal to the successive node.

19. The data transmission method according to claim 16, wherein,

the nodes each further comprise a power supply step of supplying power used for operation in the processing step, the reception step, and the transmission step,

if the cessation of the electric signal sent from the

preceding node is detected, the reception step sends, to the control step of its own node, a notification indicating the cessation, and

based on the notification sent by the reception step of its own node, the control step stops the power supply step of its own node from supplying power used for operation of the processing step, the reception step, and the transmission step.

20. The data transmission method according to claim 16, wherein

the nodes each further comprise a signal monitoring step of detecting the electric signal sent from the preceding node and sending, to the control step, a notification indicating the detection,

in at least one of the nodes, based on a predetermined return condition, the control step starts operation by the processing step, the reception step, and the transmission step of its own node in stopped state, and the transmission step resumes the transmission of the electric signal,

in another other node, if suspended sending of the electric signal sent from the preceding node is resumed, the signal monitoring step detects the electric signal sent from the preceding node, and sends, to the control step of its own node, the notification indicating the detection; based on the notification indicating the detection sent by the signal monitoring step, the control step

starts operation by the processing step, the reception step, and the transmission step of its own node; and operation by the transmission step is started to start the sending of the electric signal to the successive node.

21. The data transmission method according to claim 20, wherein the electric signal which each transmission step sends to the successive node after starting operation by control of the control step is a lock signal for establishing clock synchronization with each other.

22. The data transmission method according to claim 21, wherein the node which resumes the transmission of the electric signal based on the predetermined return condition is a master, which performs data transmission with a clock held thereby.

23. The data transmission method according to claim 16, wherein the communications protocol used by the processing step is defined by Media Oriented Systems Transport (MOST).